Catchment Area Delineation Using GIS technique for Bekhma Dam

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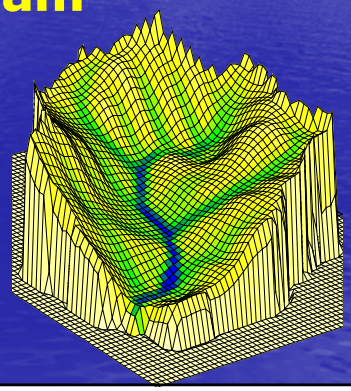
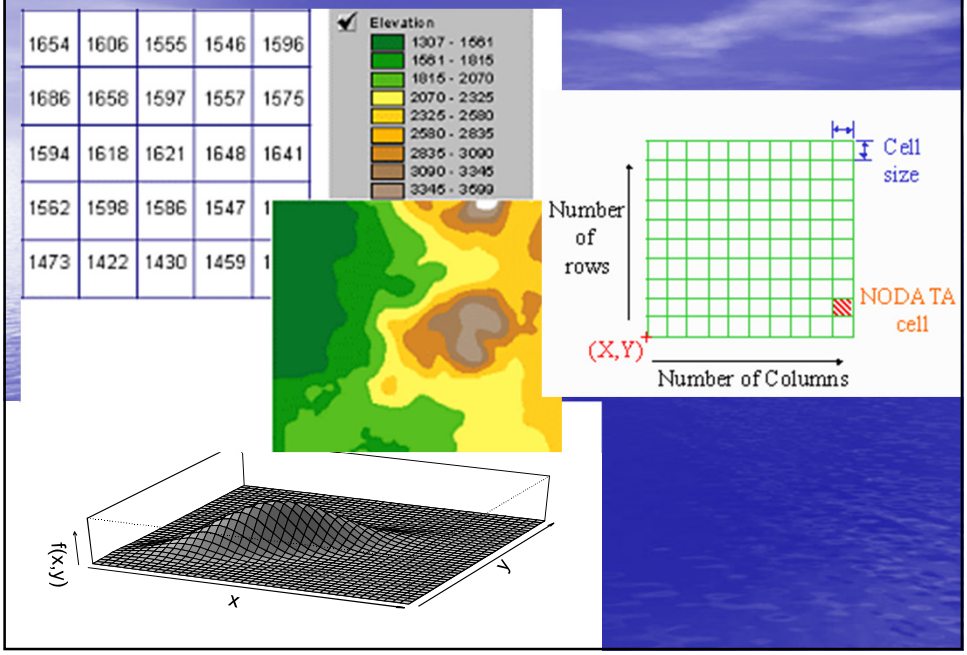
MOWR Iraq

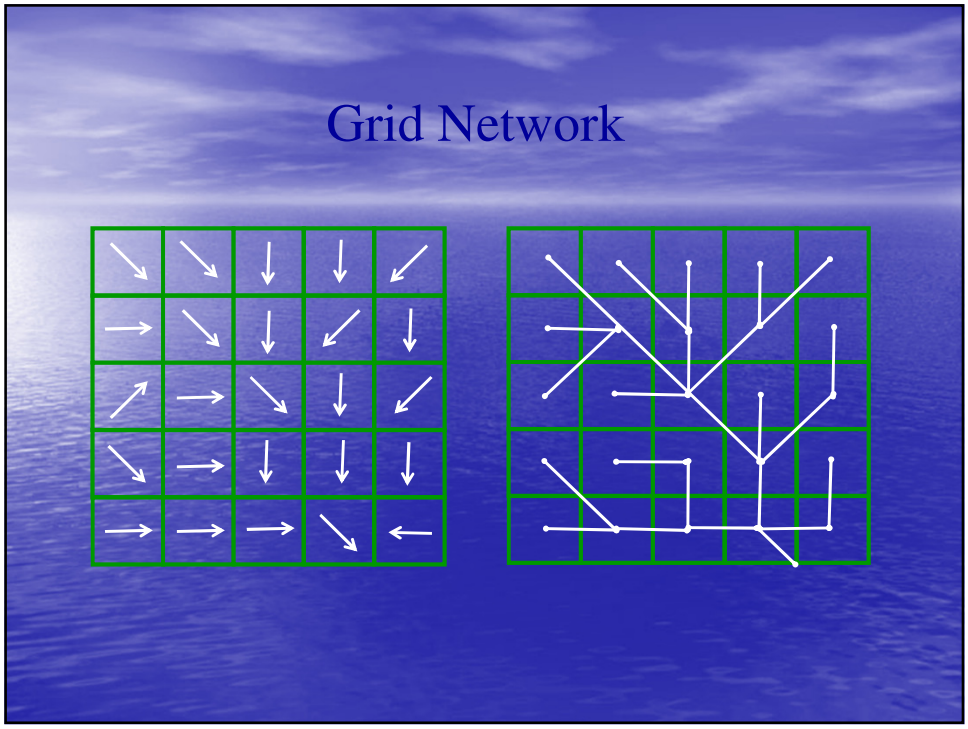


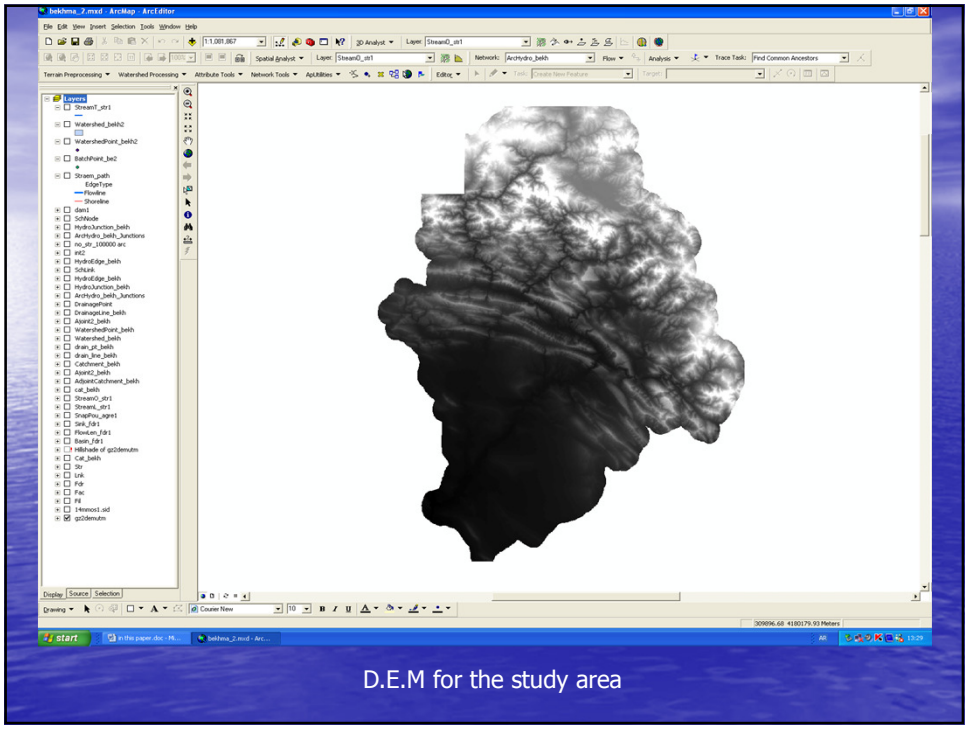
This paper represents a methodology for DEM pre-processing that provides the basis for fast and consistent watershed delineation on DEMs of any resolution and size using desktop GIS technology

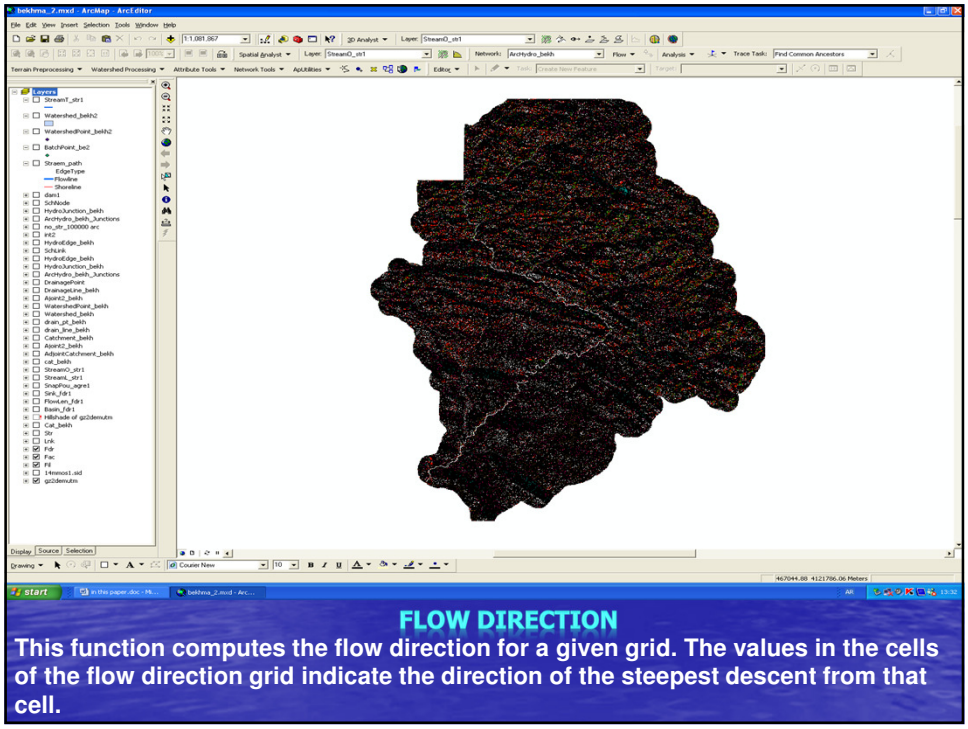
- The main data is the DEM with 1 arc second to get as much accurate results as could.
- Raster analysis is performed to generate data on flow direction, flow accumulation, stream definition, stream segmentation, and watershed delineation.
- The utility of Arc Hydro tools (GIS) is used to develop attributes that can be useful in hydrologic modeling.
- Watershed delineation is one of the most commonly performed activities in hydrologic analyses.
- Digital elevation models (DEMs) provide good terrain representation from which watersheds can be derived automatically using GIS technology.

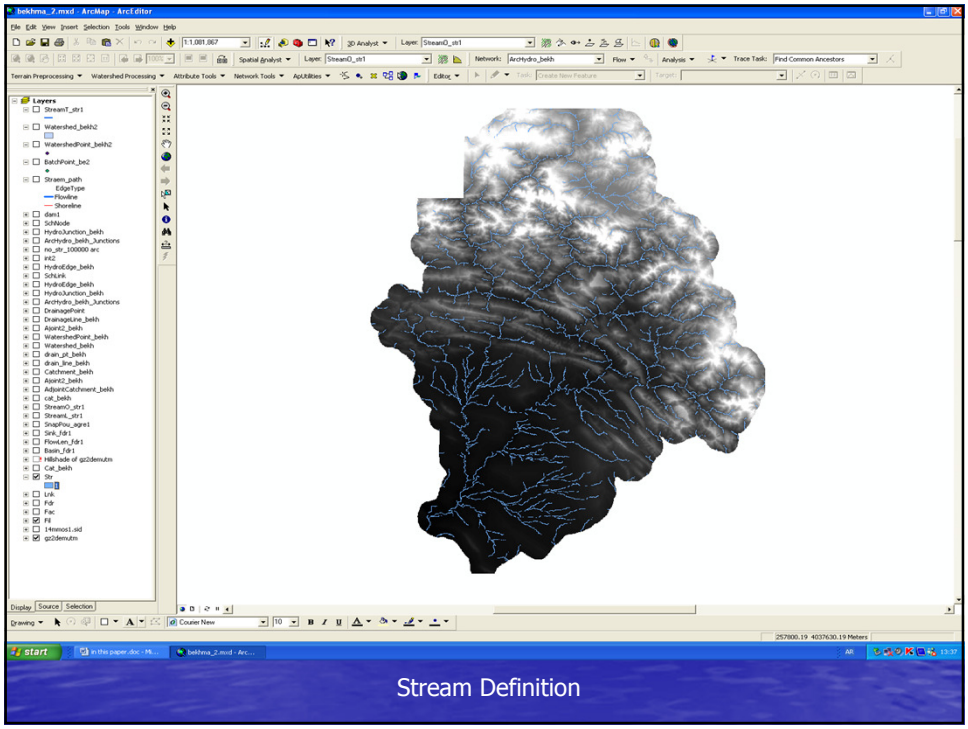
Grid used to represent a continuous surface field

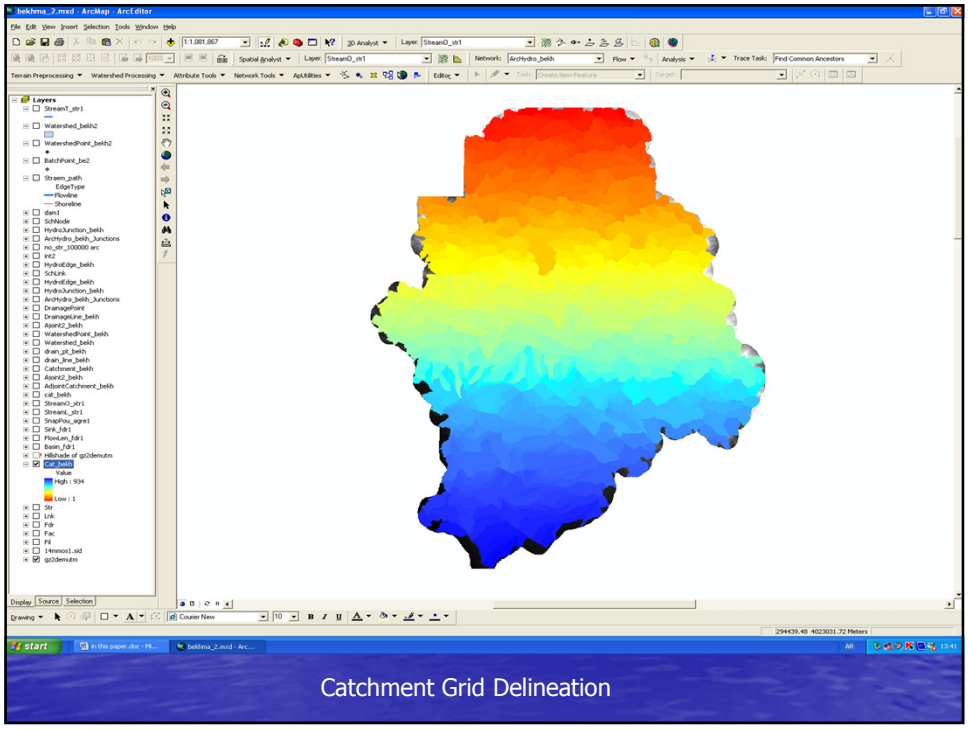



Grid Network

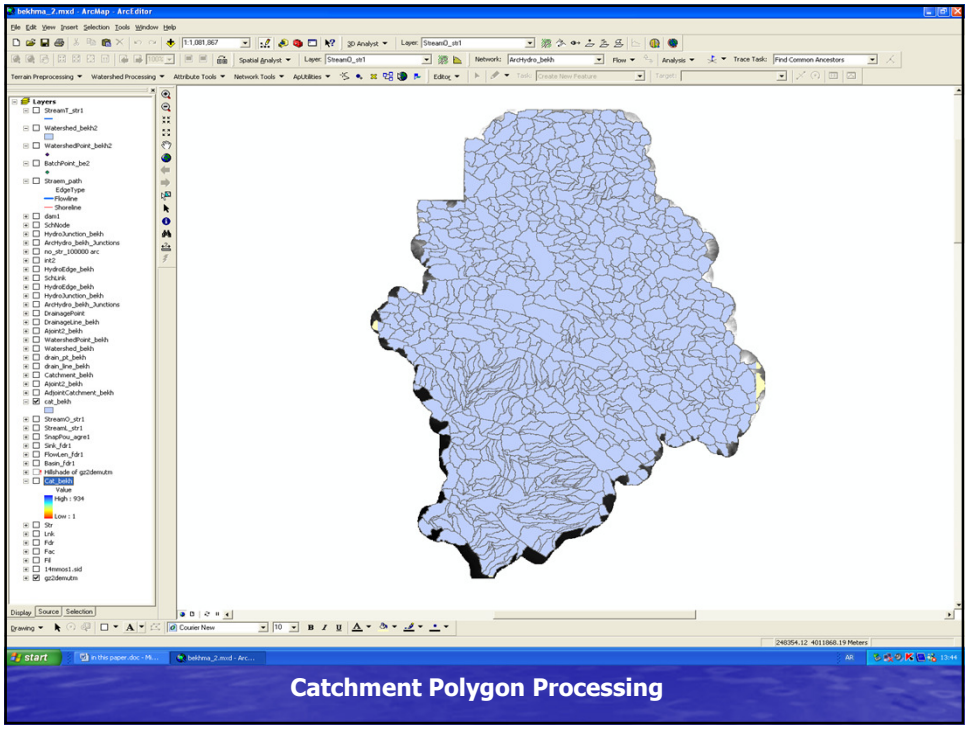

D.E.M for the study area


FLOW DIRECTION
This function computes the flow direction for a given grid. The values in the cells of the flow direction grid indicate the direction of the steepest descent from that cell.

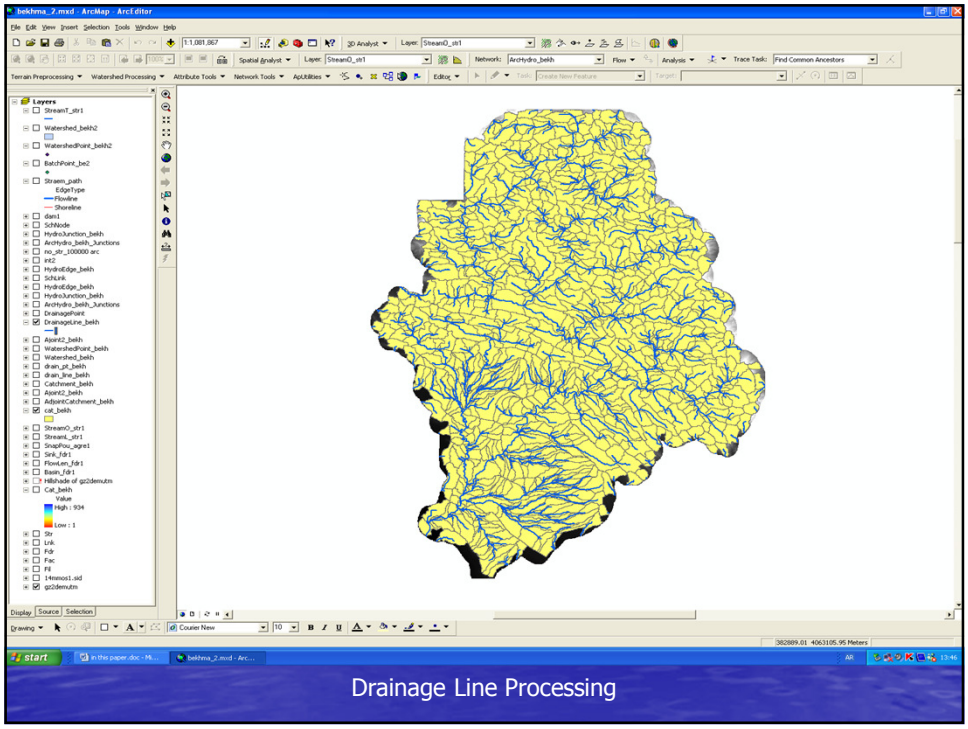

Stream Definition



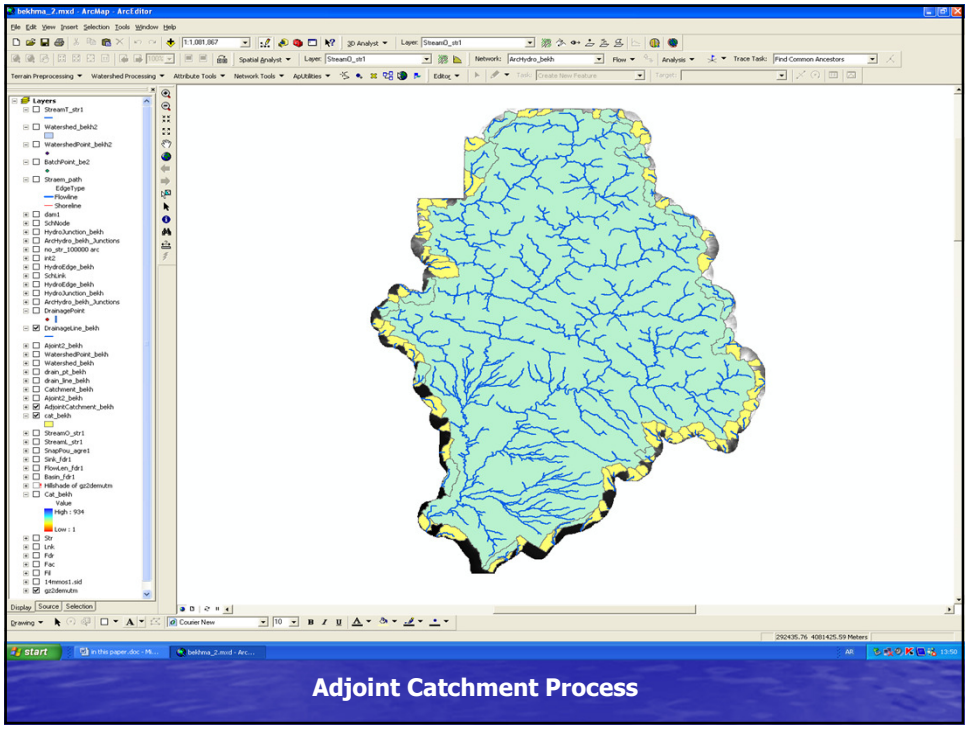
Catchment Grid Delineation



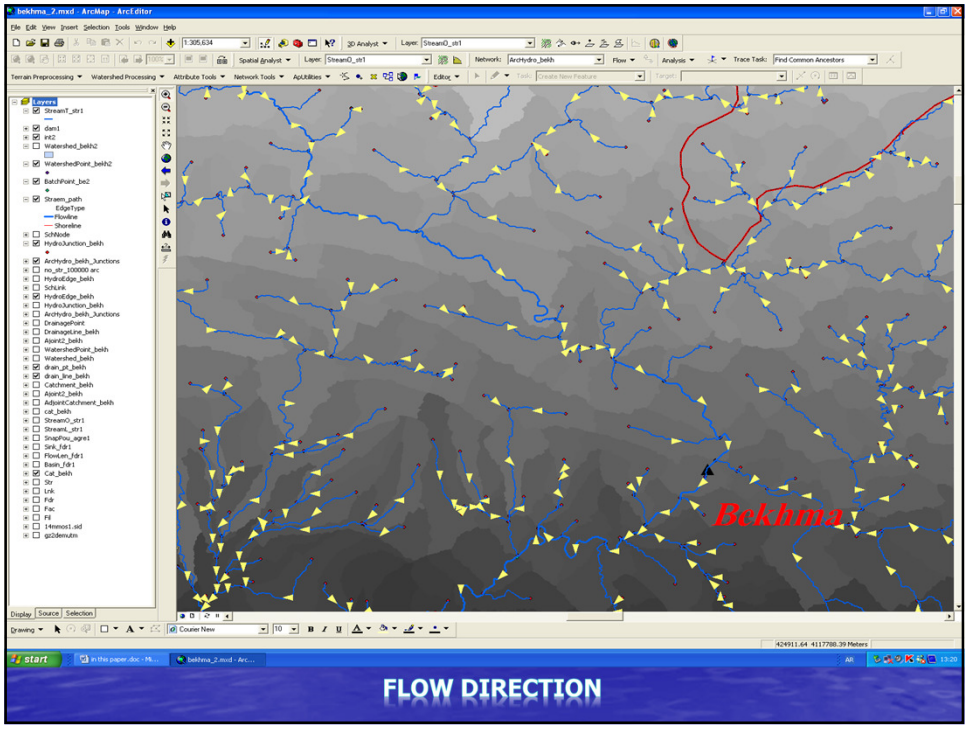
Catchment Polygon Processing

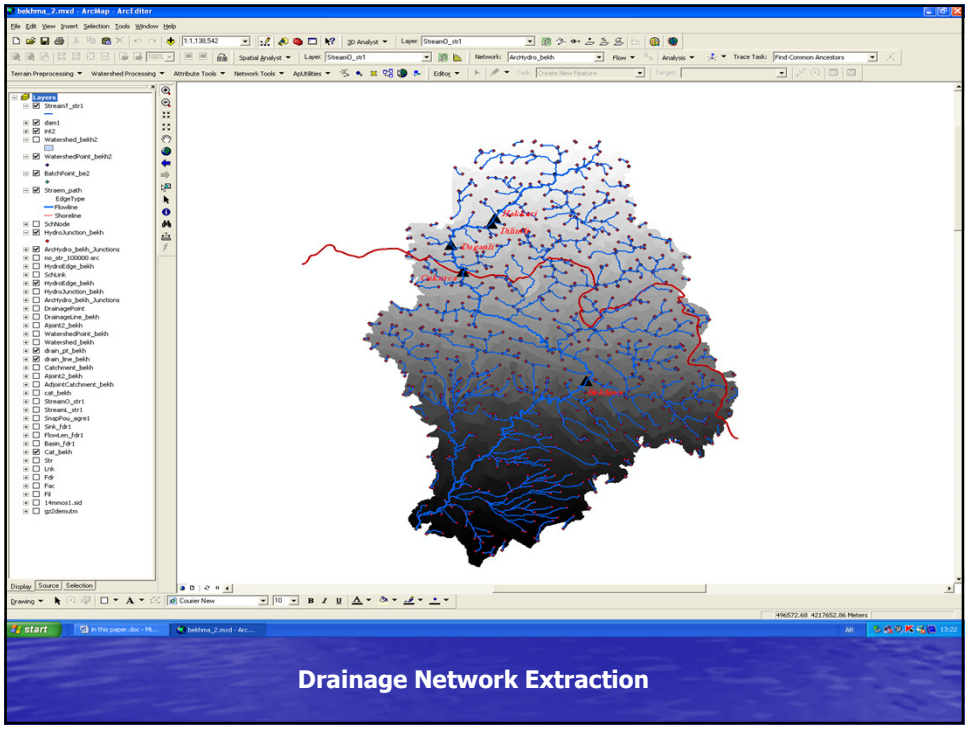


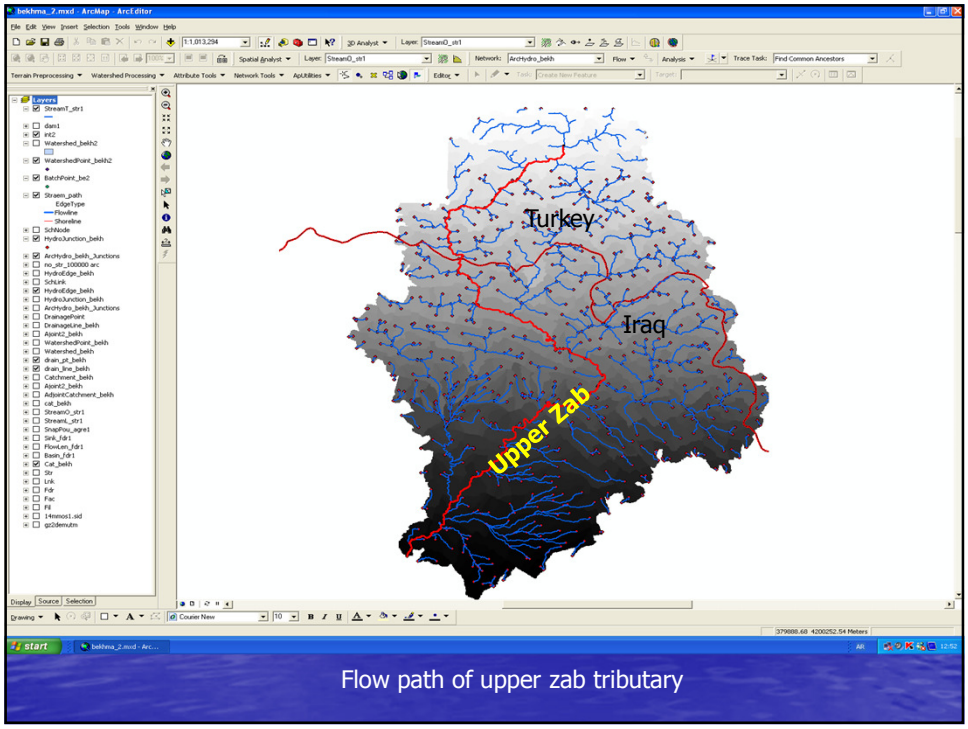
Drainage Line Processing



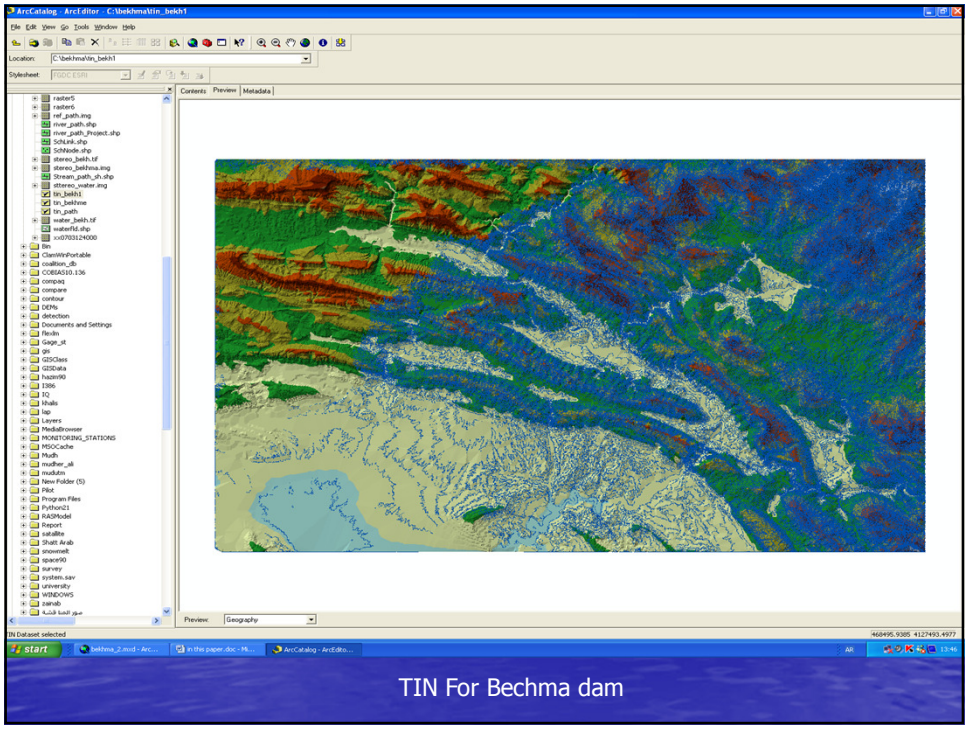
Adjoint Catchment Process


Bekhma
FLOW DIRECTION

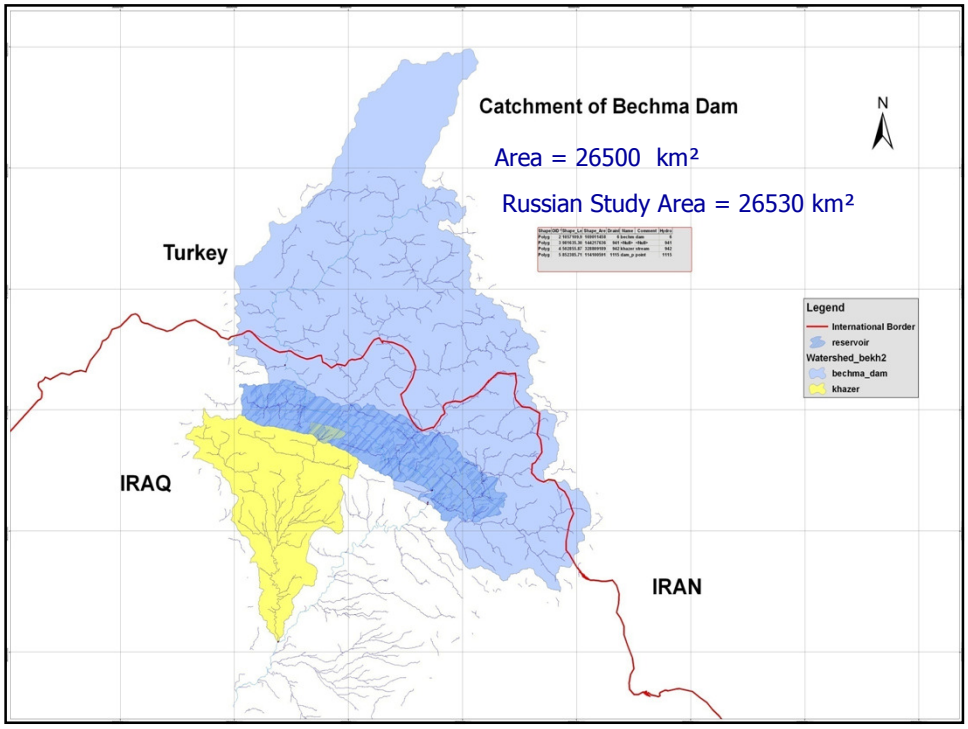

Drainage Network Extraction

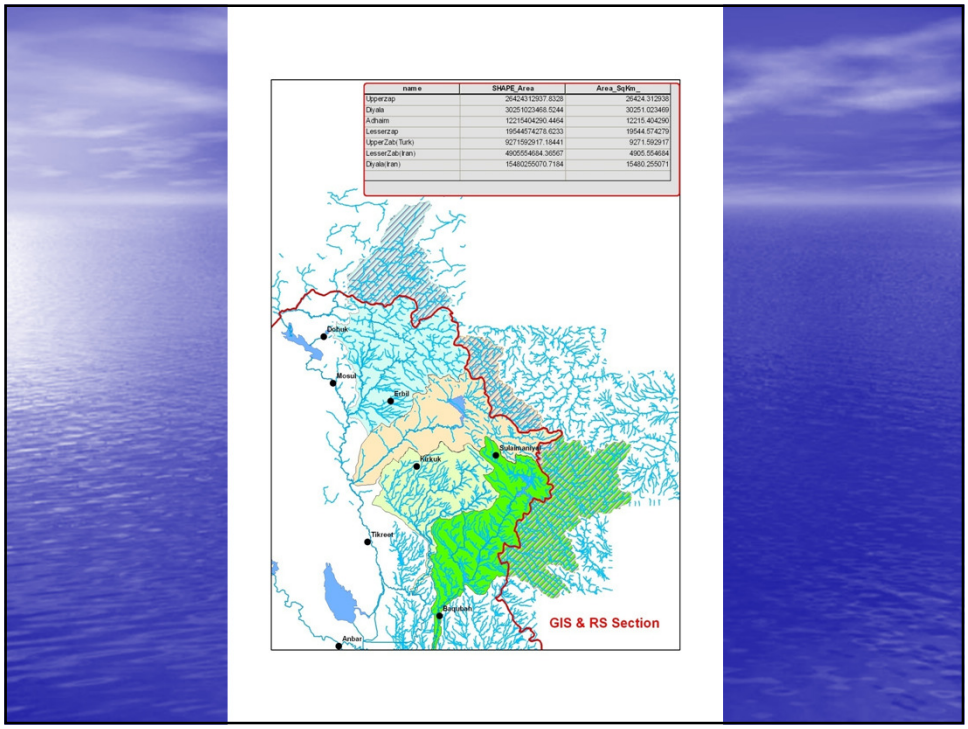


Flow path of upper zab tributary



TIN For Bechma dam


Catchment of Bechma Dam
Area = 26500 km²
Russian Study Area = 26530 km²
N
Turkey
IRAQ
IRAN
Legend
International Border
reservoir
Watershed_bekh2
bechma_dam
khazer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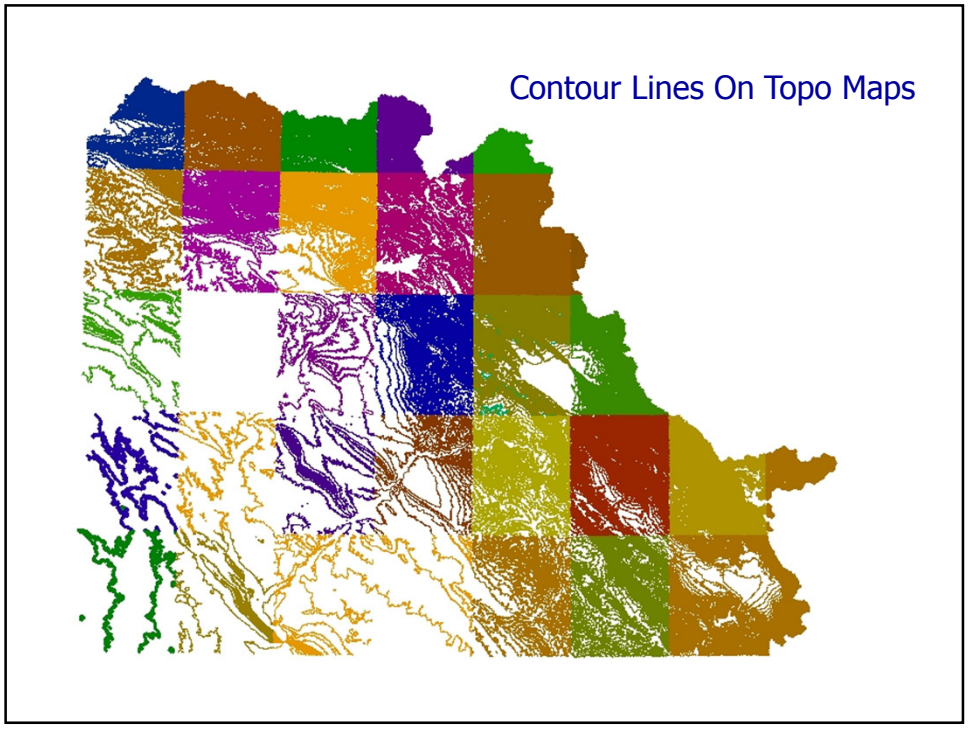
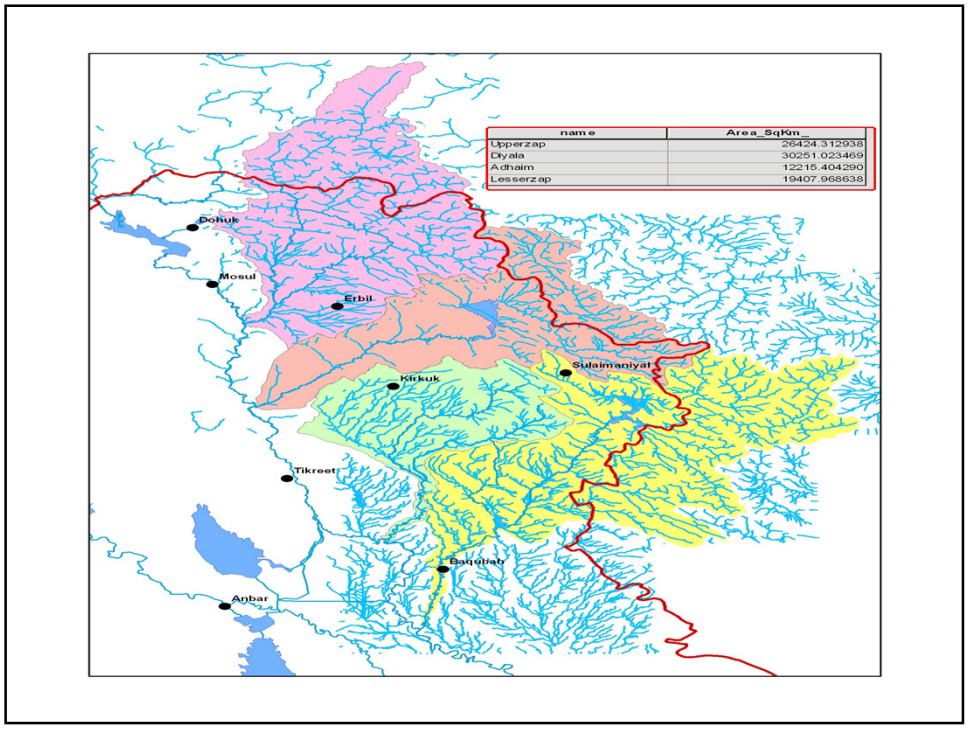
Area_SqKm_
Upperzap 26424312937.8328 26424.312938
Diyala 30251023468.5244 30251.023469
Adhaim 12215404290.4464 12215.404290
Lesserzap 19544874278.6233 19544.874279
UpperZab(Turk) 9271592917.19441 9271.592917
LesserZab(Iran) 4905554684.36567 4905.554684
Diyala(Iran) 15480255070.7184 15480.255071
Dohuk
Mosul
Erbil
Nkkuk
Tikreet
Baqubah
Anbar
GIS & RS Section


Contour Lines On Topo Maps


name
Area_SqKm
Upperzap 26424.312938
Diyala 30251.023469
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Dohuk
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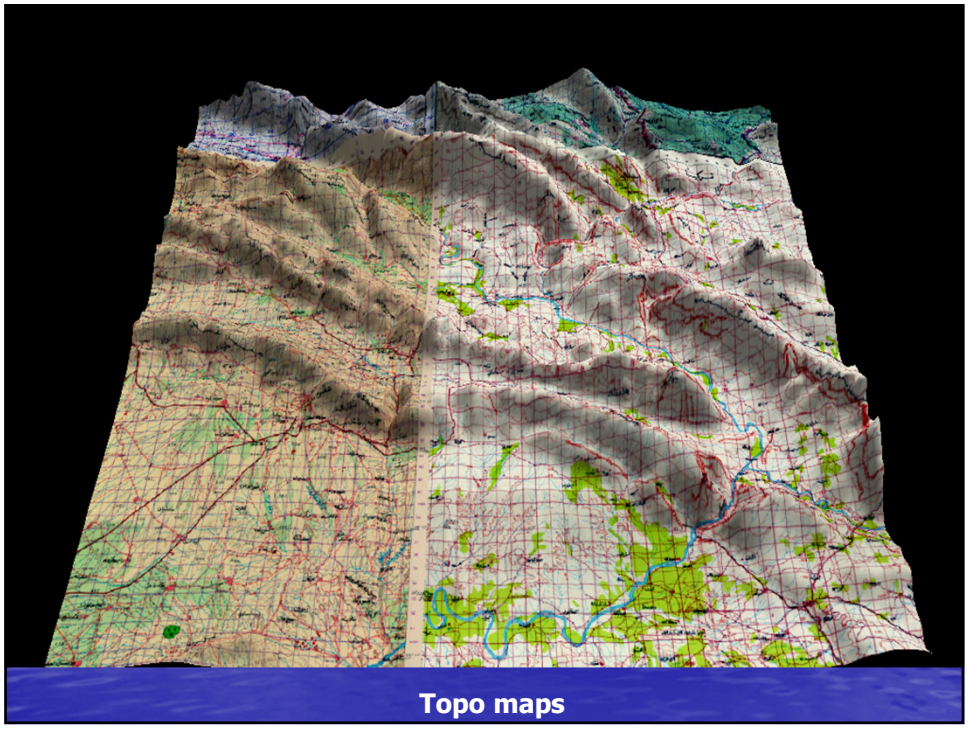
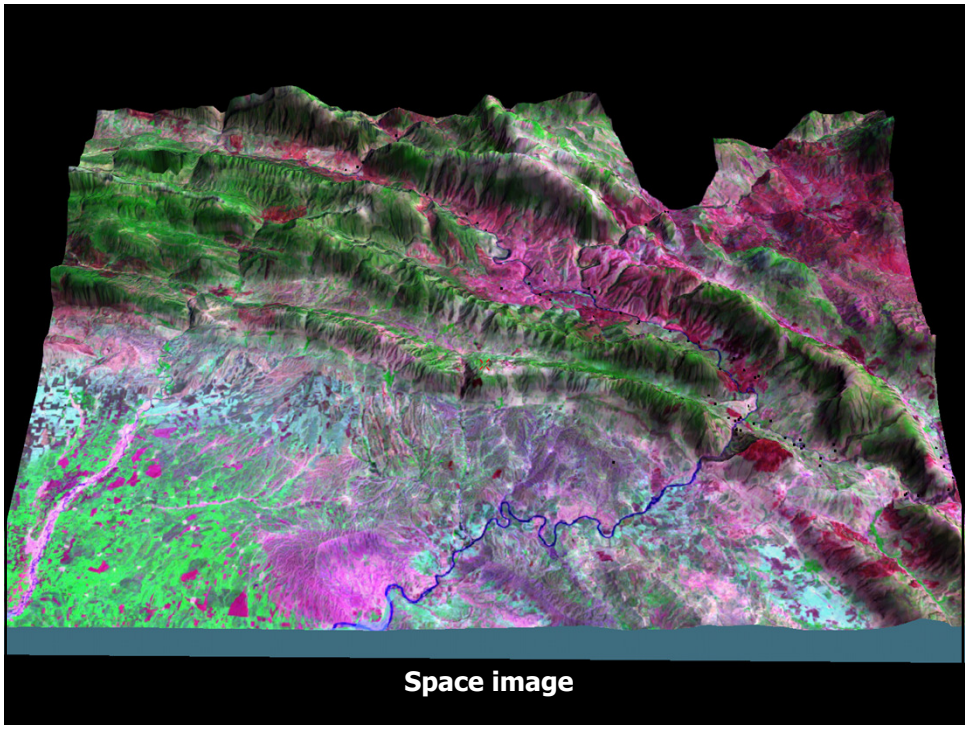
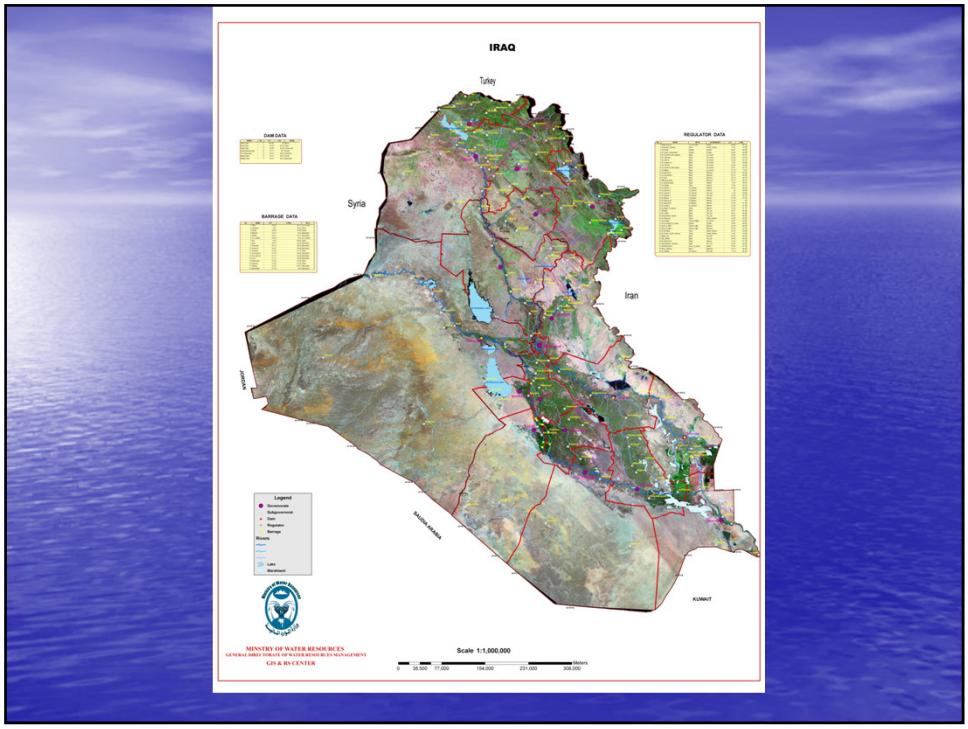
Tikreet
Baghdad
Anbar


Topo maps


Space image



Conclusion

1. We find the great importance of using the D.E.M. in hydrographic studies.
2. Instead of studying the contour lines for many topographic maps which take long time to understand the topo surface, then delineated the watershed of each stream or river, we used here the ArcHydro extension that use the D.E.M. as a base for analyze and delineate the watershed in few hours and find it's area directly.
3. One of the great advantages of using GIS for hydrologic studies is to suggest the best location for dams or to locate monitoring (gauge) points.

Thank you